Air Force Civil Engineer Center

FORMER
WILLIAMS AIR FORCE BASE

Site LF004 Landfill Remedial Action

BCT Conference Call
20 June 2019

LF004 Recent and Upcoming Activities

- Post remediation soil gas sampling is complete
- Post remediation PDB groundwater sampling for May 2019 is complete. Laboratory results pending.
- Draft annual landfill inspection report submitted xx Jun 2019

Air Force Civil Engineer Center

FORMER
WILLIAMS AIR FORCE BASE

Site FT002
Fire Training Area Remedial Action

BCT Conference Call
20 June 2019

Site FT002 Update

- AF approved keeping the DEUR in place Nov 2018
- AF will prepare Explanation of Significant Differences (ESD) document to add the land use control to the ROD
- AF response to EPA and ADEQ comments on Remedial Action Completion Report in progress
- If necessary, a technical conference call with regulatory agencies to resolve comments can be scheduled

Air Force Civil Engineer Center

FORMER
WILLIAMS AIR FORCE BASE

Site SS017

Old Pesticide/Paint Shop

BCT Conference Call

20 June 2019

Battle Ready...Built Right!

Site SS017 Groundwater Monitoring Update Path Forward

- Aug 2018 data summary report submitted 12 Apr 2019
- Nov (Annual) 2018 groundwater report submitted 18 Apr 2019. Reissued hard copy reports on 30 Apr 2019.
- Contract modification for 2019/2020 groundwater sampling finalized 17 Jun 2019
- Groundwater sampling will be performed in Jun 2019 for Q2

Parcel K-1-2 Property Transfer

- Draft FOST and SEBS issued 30 November 2018
- ADEQ comments received 3 and 7 January 2019
- Draft final FOST and SEBS including RTC to ADEQ comments posted for public comment. Comment period end 25 Mar 2019; no comments received.
- EPA comments received 11 Mar 2019
- Draft final FOST and SEBS issued to ASU for coordination
- Revised Draft Final FOST to be issued for regulatory concurrence
- Final FOST to be routed for AF signature after regulatory concurrence
- Draft DEUR and deed to be prepared

Air Force Civil Engineer Center

FORMER
WILLIAMS AIR FORCE BASE

Site ST035
Former Building 760

BCT Conference Call
20 June 2019

ST035 Update

- SVE system and enclosure decommissioning in progress. ASU has indicated that the concrete pad, walls, and fencing will be retained for use by facilities management.
- Procurement of monitoring well abandonment in progress. Well abandonment tentatively scheduled in the Aug-Sep 2019 time frame.

Partial Deletion

BCT Conference Call
20 June 2019

PARTIAL DELETION UPDATE

- Draft table and figure submitted for regulatory review on 29 Sep 2014
- Comments received by ADEQ during Sep 2014 BCT meeting addressed in follow on email. No comments received from EPA.
- Deletion on hold during SS017 and ST012 informal disputes
- Final deletion tables and figure ready for submittal and provided to BCT in April 2019 BCT meeting
- EPA to provide input on PCOR status for the partial deletion docket
- Draft NOIPD submittal for ADEQ/EPA review scheduled for Aug 2019

FORMER
WILLIAMS AIR FORCE BASE

Site ST012
Former Liquid Fuel Storage Area

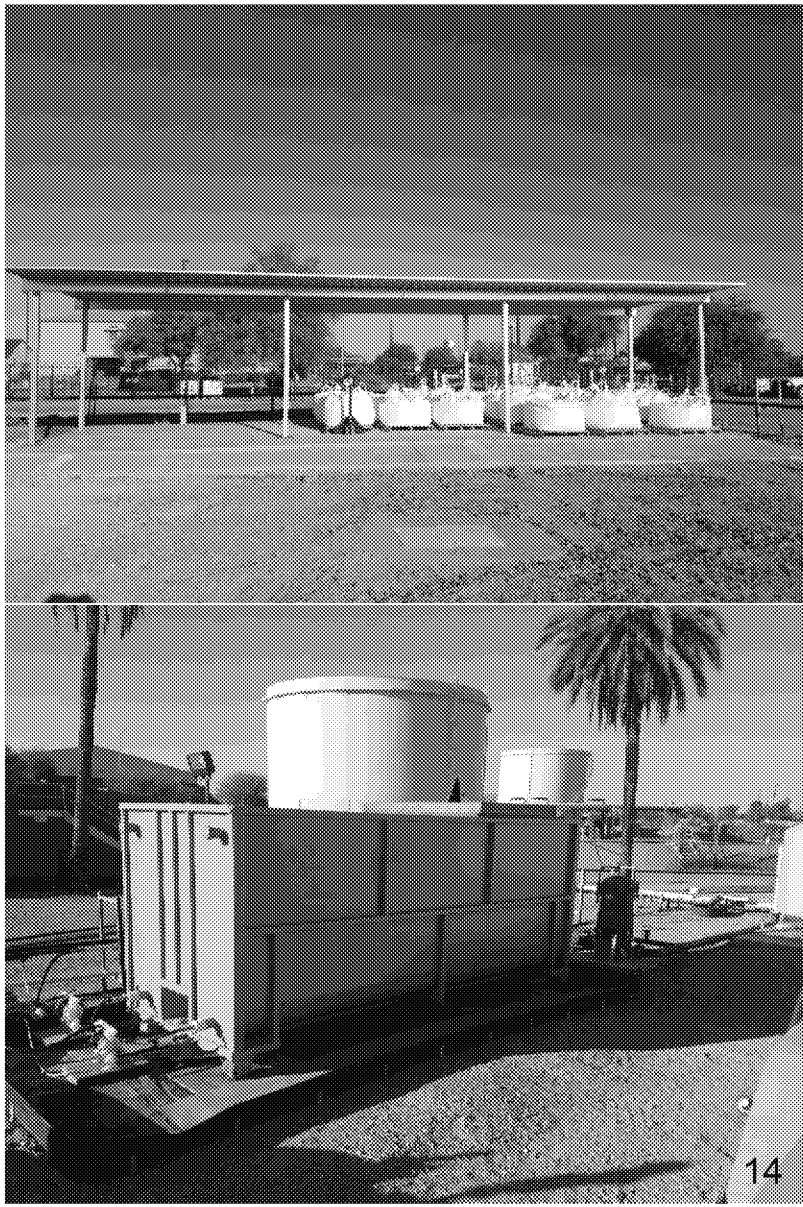
BCT Conference Call
20 June 2019

Site ST012 Outline

- Summary of activities since May BCT call
- Update on SVE system (JP-4 equivalent of methane)
- LNAPL monitoring/removal update
- Pilot study extraction/injection update
- Path forward

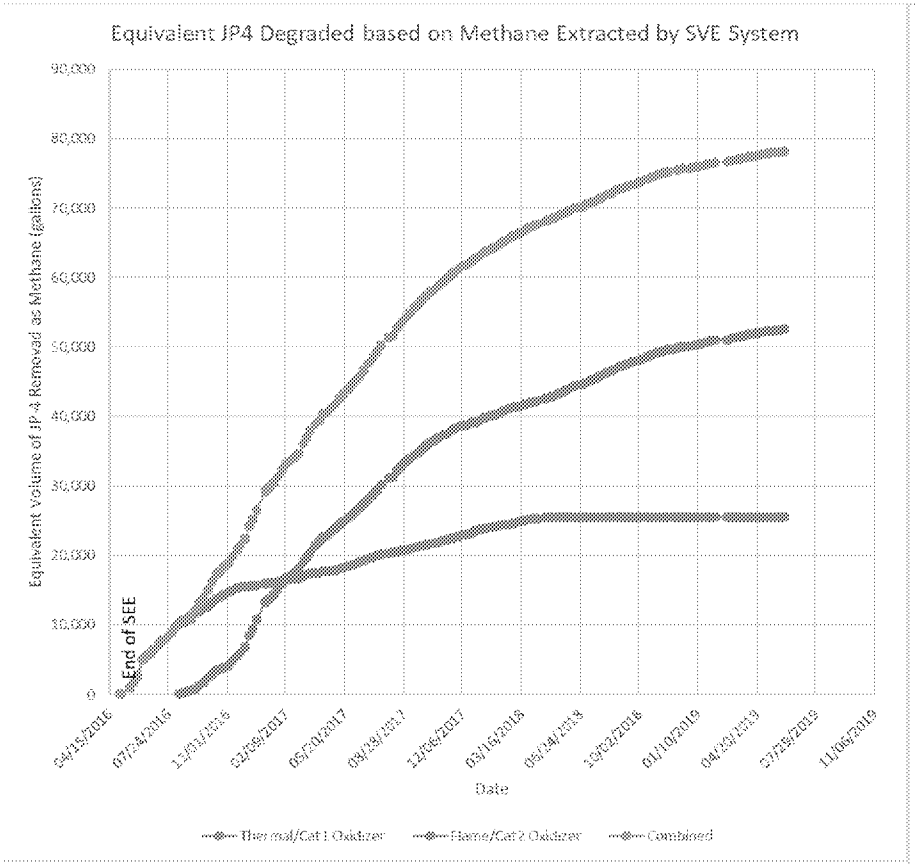
Site ST012 Activities Since May

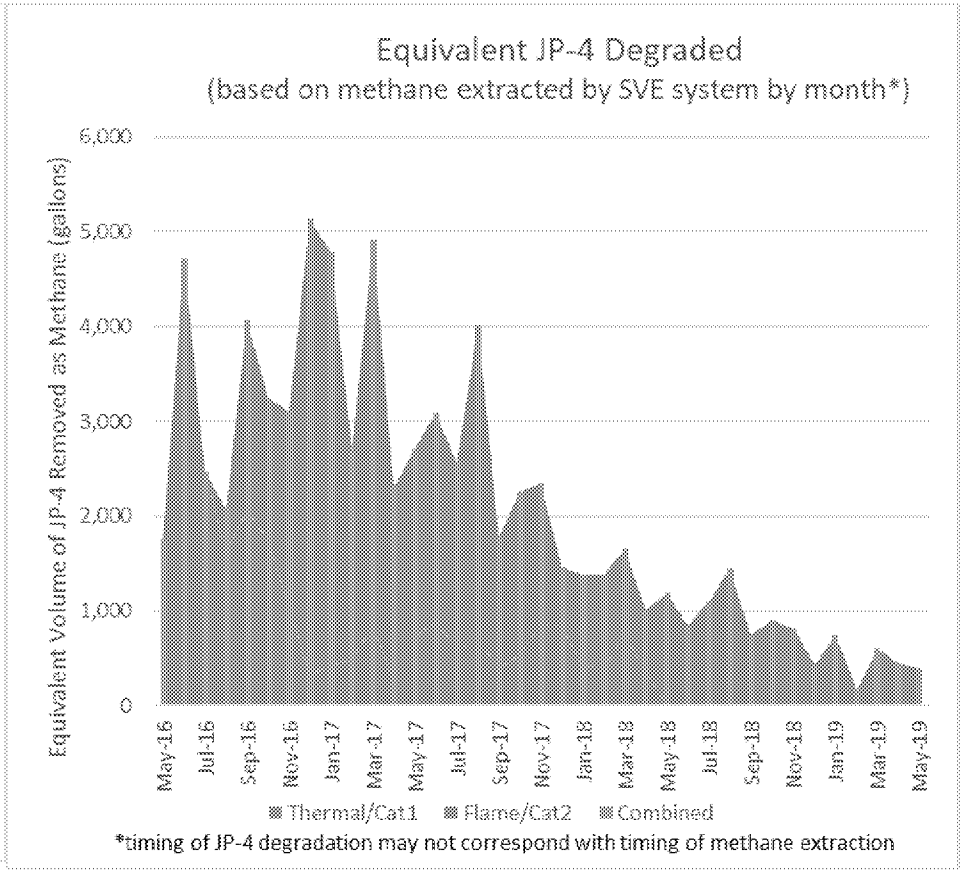
- **Continued SVE operation**
- **Continued LNAPL screening in accessible wells**
- **Operation of Extraction and Treatment**
  - **Pump repairs**
    - CZ18 and UWBZ22 replacement motor installed
    - Treatment system maintenance
      - Influent flow meter replacement
      - Piping work on standby GAC to address drips
    - CZ07 motor failed, replaced with pump from LSZ39
- **Sodium sulfate injections (detail on later slides)**



JP-4 Degradation Based on Methane Removed with SVE

Site ST012 SVE System Equivalent JP-4 Degradation Based on Methane Removed

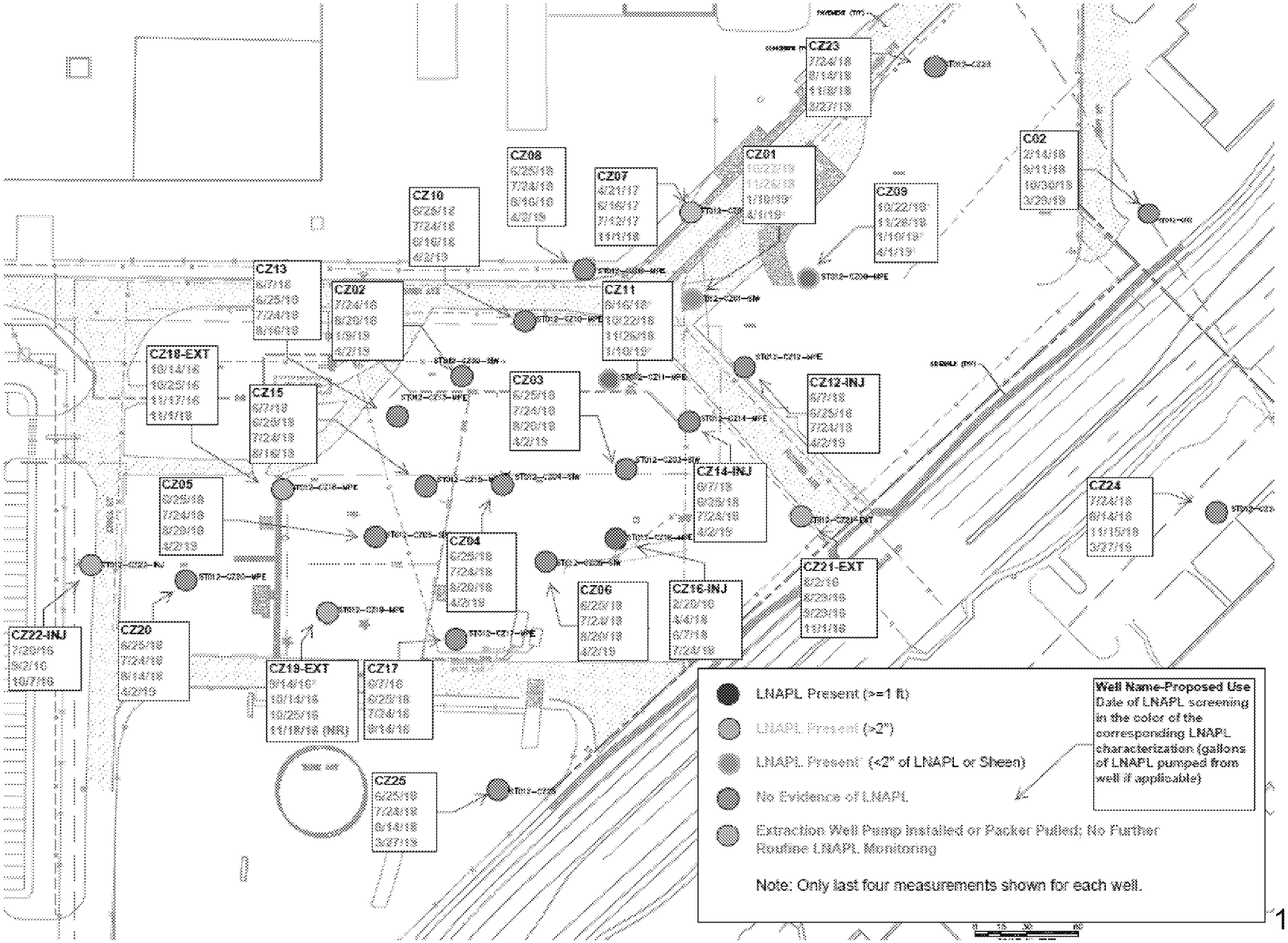




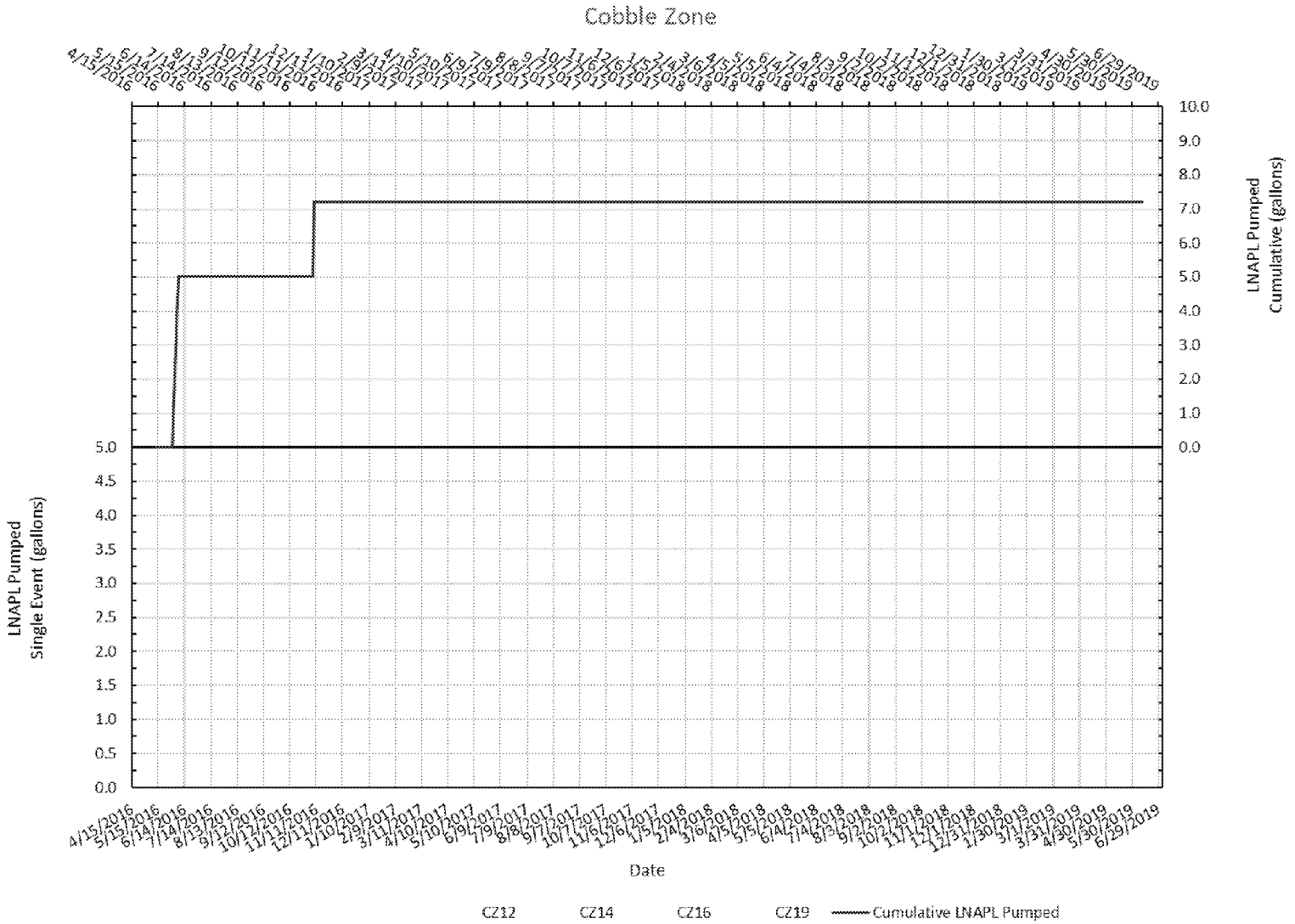
- Estimates through 06 June 2019
- Estimated JP-4 degradation as methane is in addition to JP-4 removal reported for SVE
- Thermal/Cat1 oxidizer changed from SVE to groundwater treatment end of Apr 2018
- Flame oxidizer treating combined SVE and air stripper intermittently in Nov 2018 – Jan 2019
- Flame oxidizer replaced by catalytic oxidizer (Cat2) 7 Feb to 26 Feb 2019

LNAPL Monitoring Update (through 11 June)

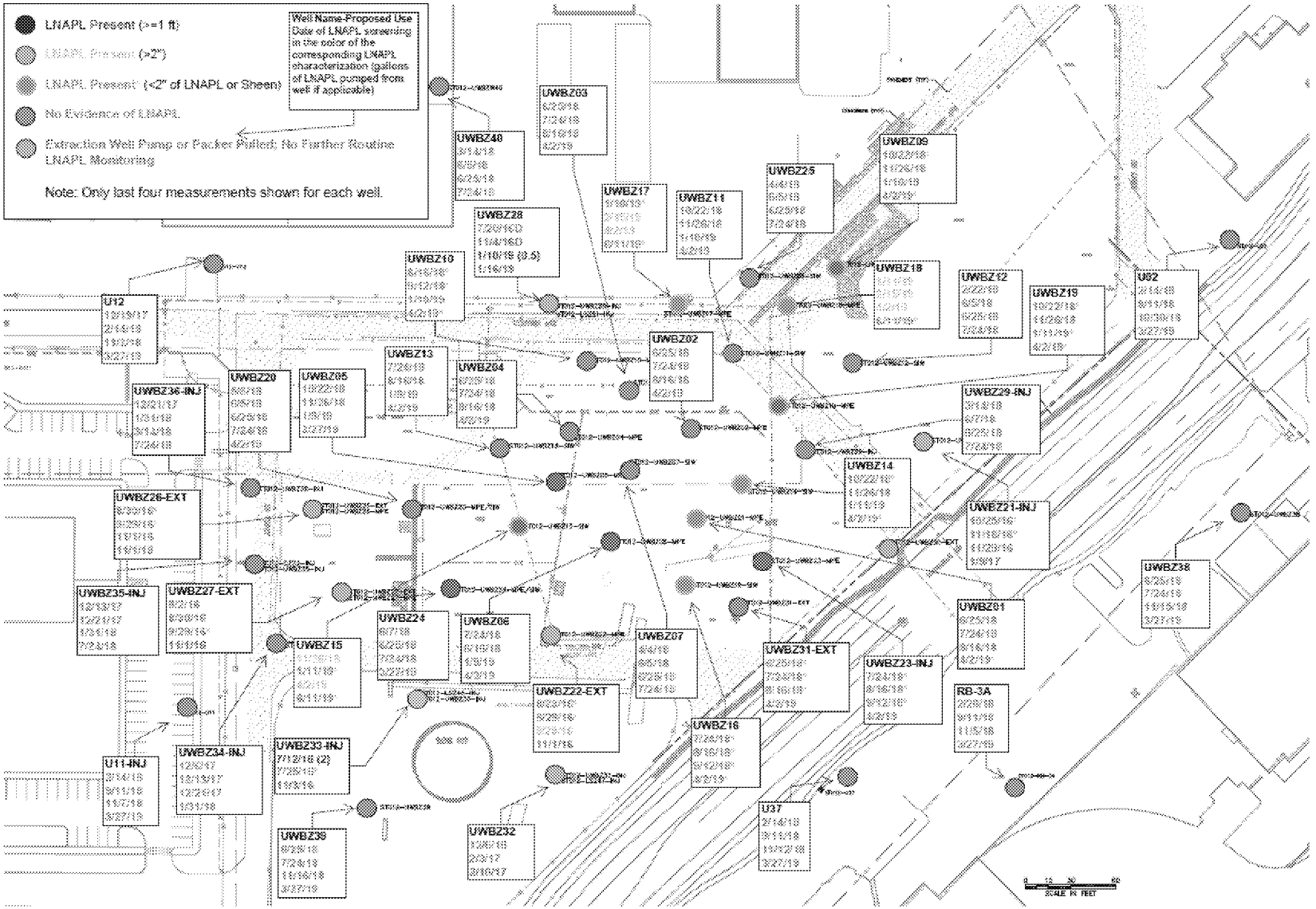
LNAPL Monitoring/Removal Status
Cobble Zone



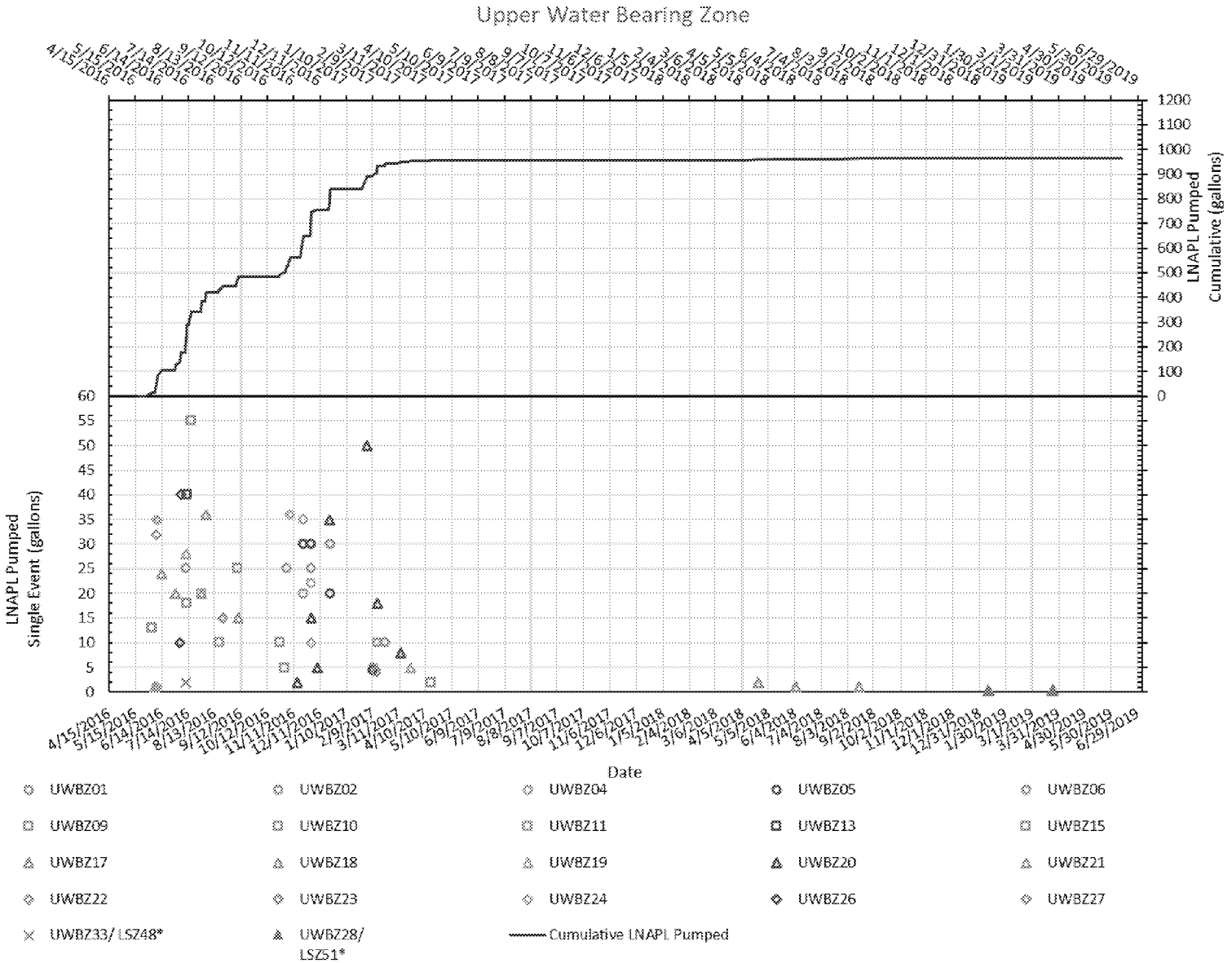
LNAPL Monitoring/Removal Status
Cobble Zone



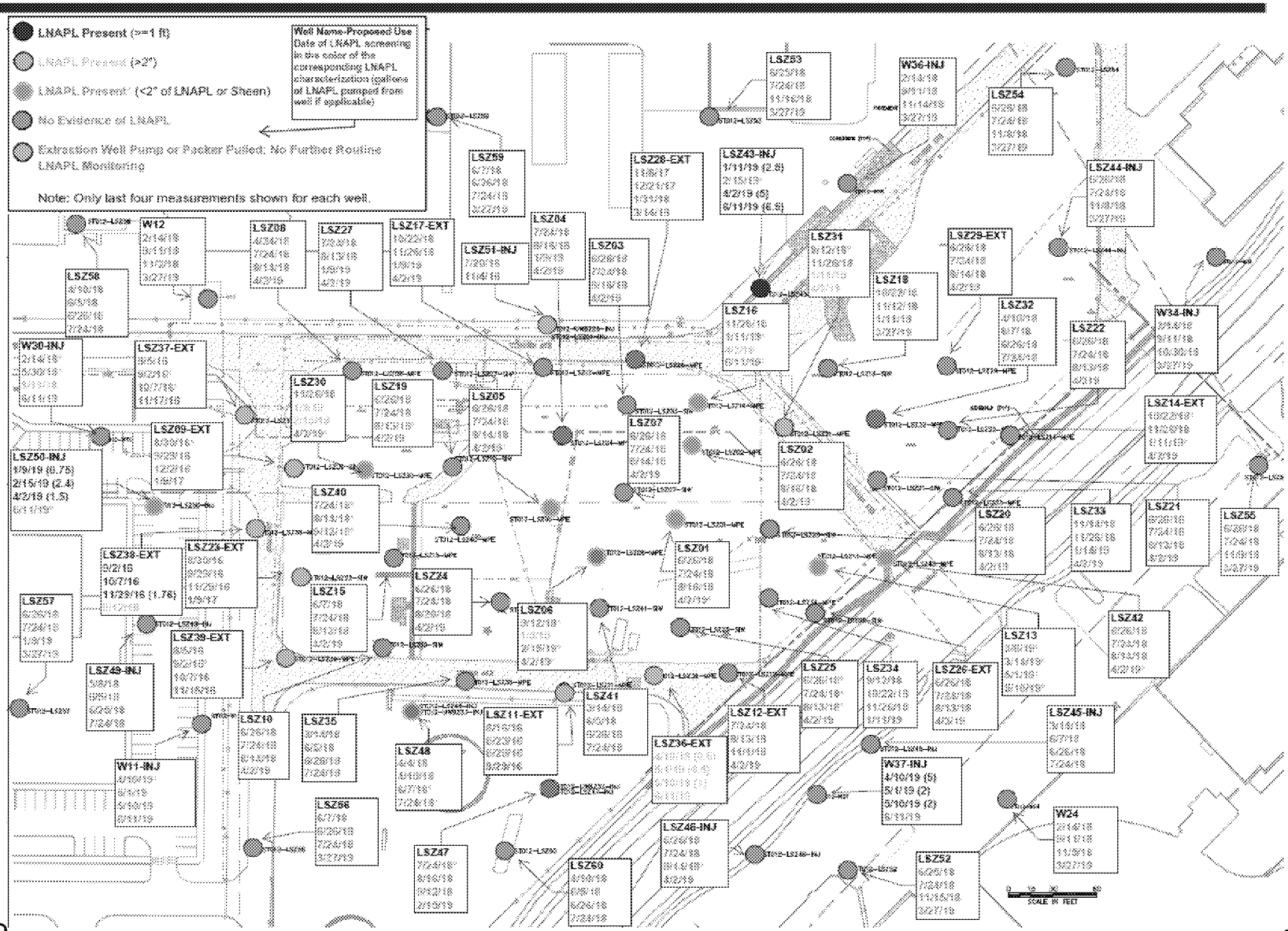
LNAPL Monitoring/Removal Status
Upper Water Bearing Zone



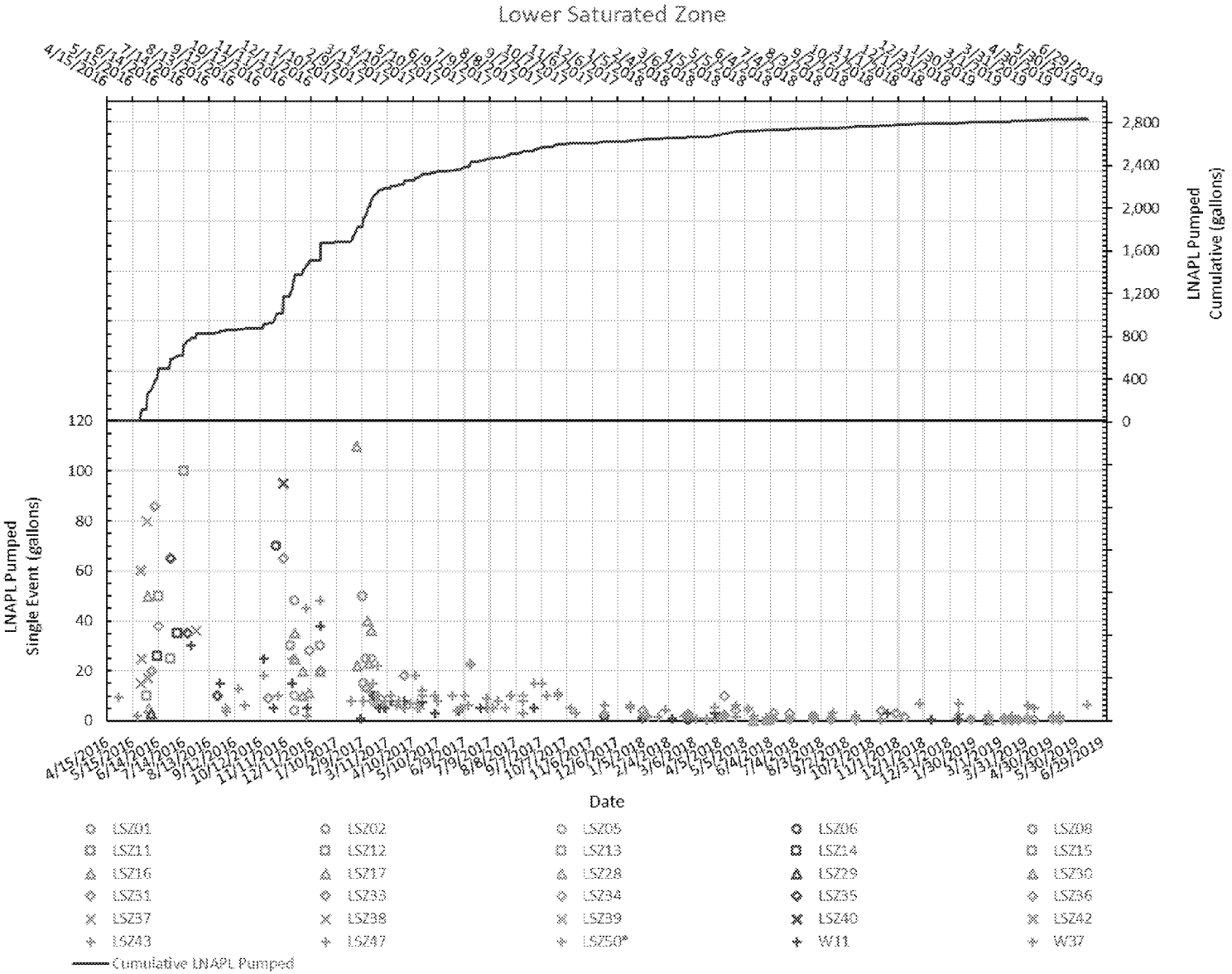
LNAPL Monitoring/Removal Status
Upper Water Bearing Zone



LNAPL Monitoring/Removal Status
Lower Saturated Zone

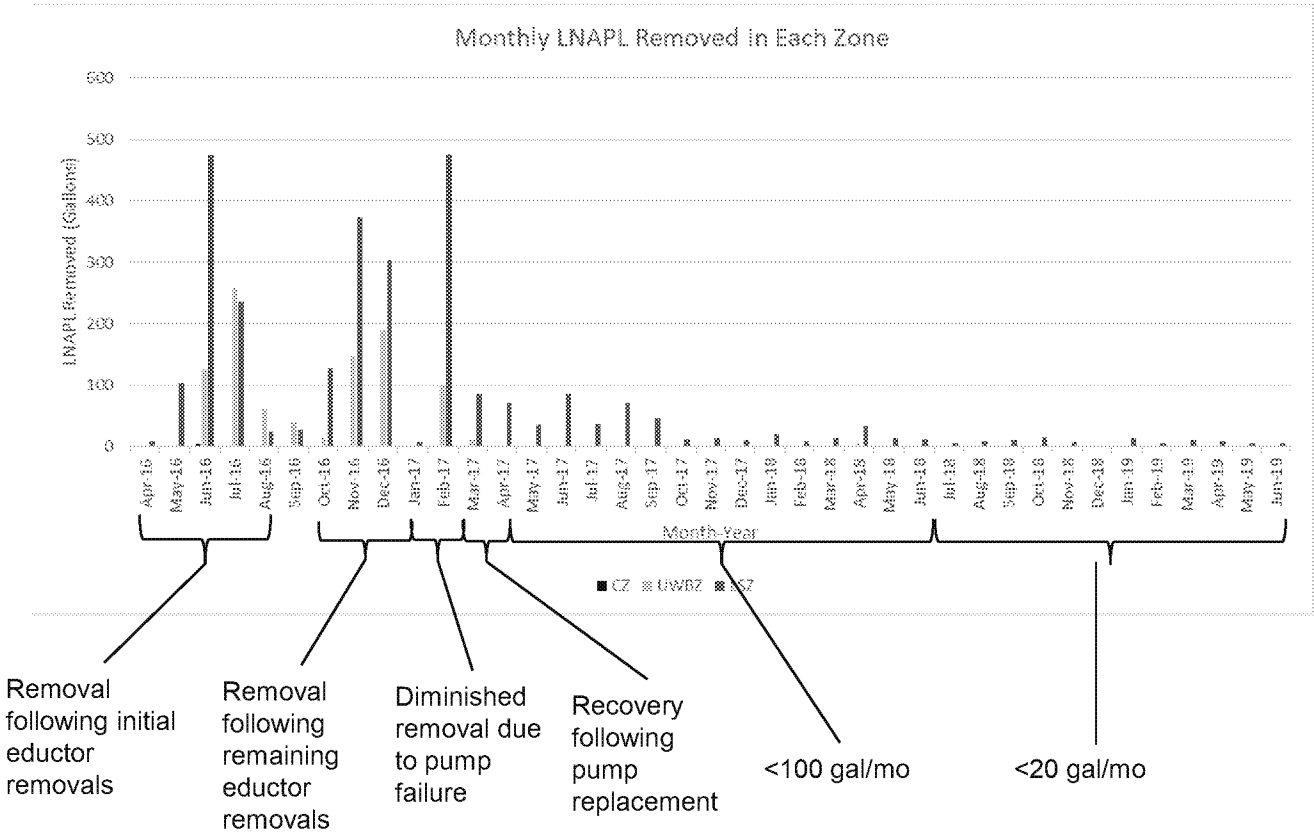


LNAPL Monitoring/Removal Status
Lower Saturated Zone



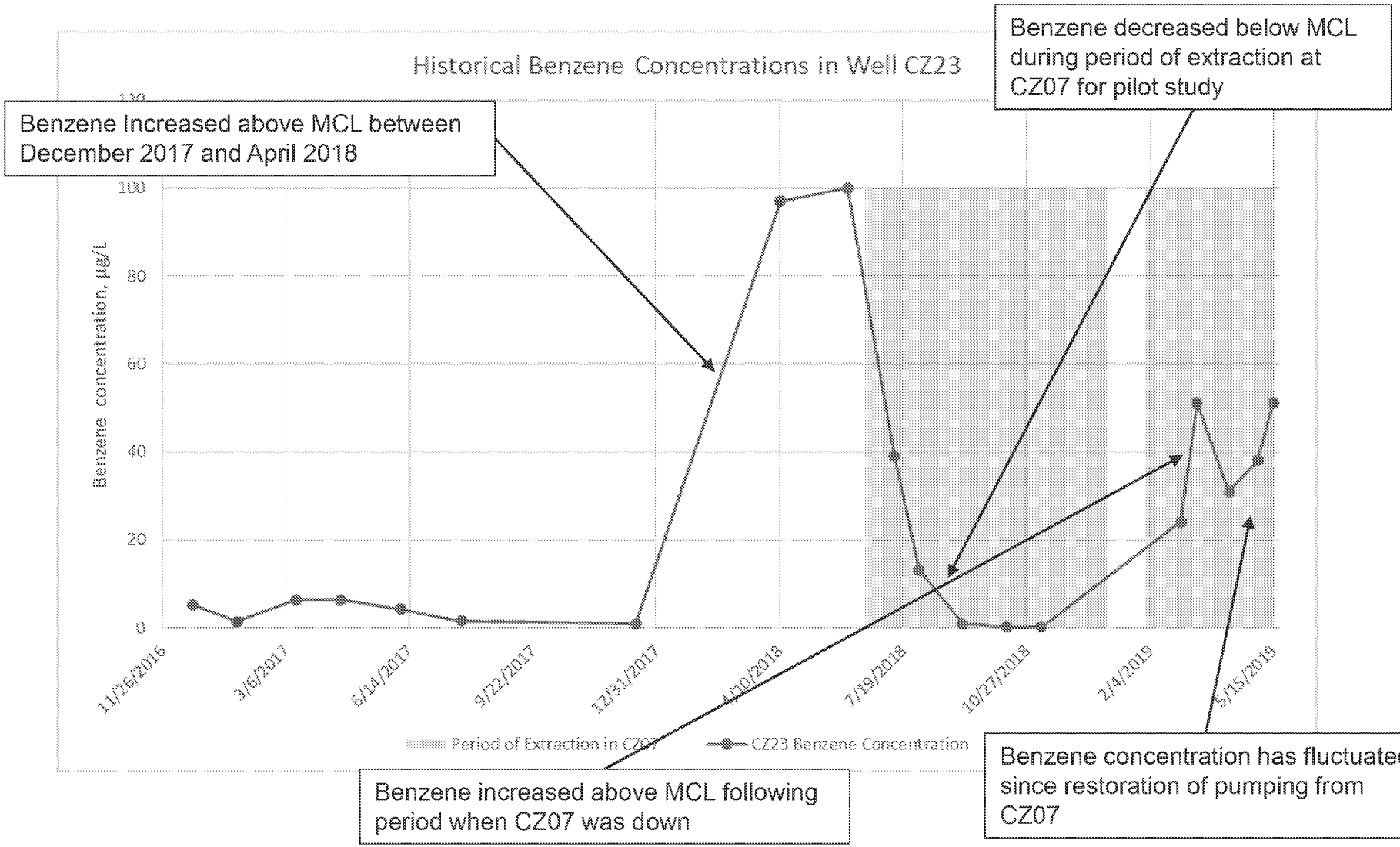
ST012 LNAPL Monitoring/Removal Summary

- **CZ – 7 gallons of LNAPL removed. None since Nov 2016**
- **UWBZ - 963 gallons of LNAPL removed. None since Apr update.**
- **LSZ - 2,839 gallons of LNAPL removed. 7 gallons removed since May update (LSZ43).**



Update on Benzene Concentration in ST012-CZ23 (includes preliminary results from 15 May 2019)

CZ23 Sampling Summary



CZ23 Current and Future Actions

- CZ23 sampled on 17 Jun 2019
- Installation of extraction pipeline and electrical conduit/wire between existing header and CZ23 has been initiated
- Construction activity anticipated to be complete in early July
- Install electric submersible pump in CZ23 and tie well pump into existing extraction and treatment system
- Start up extraction in mid July unless 17 Jun sample results are significantly reduced

Pilot Study Injection/Extraction Update

Site ST012 Extraction System Performance

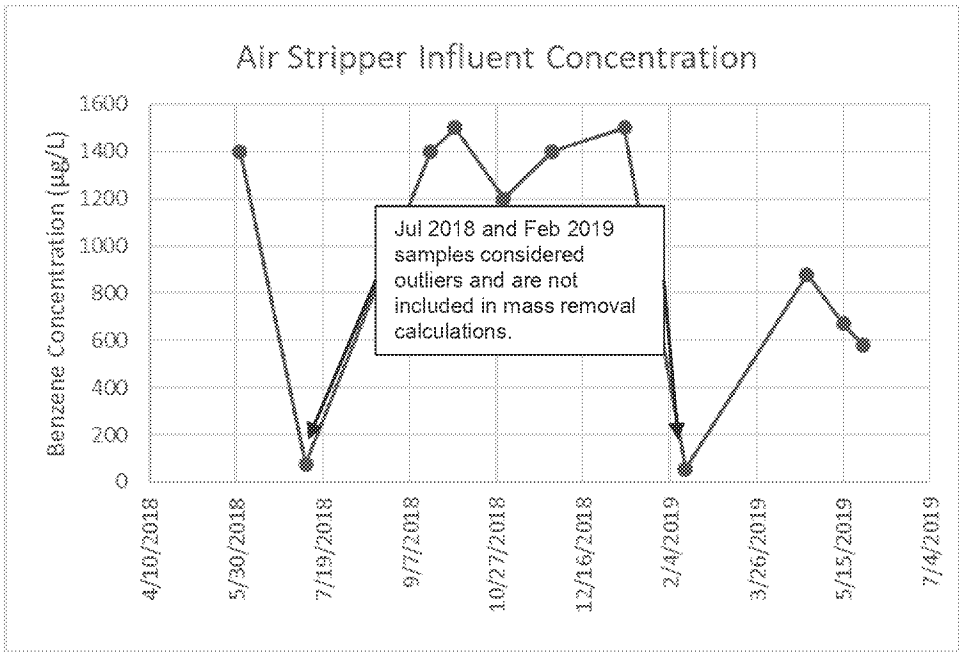
June Extraction System Status Summary

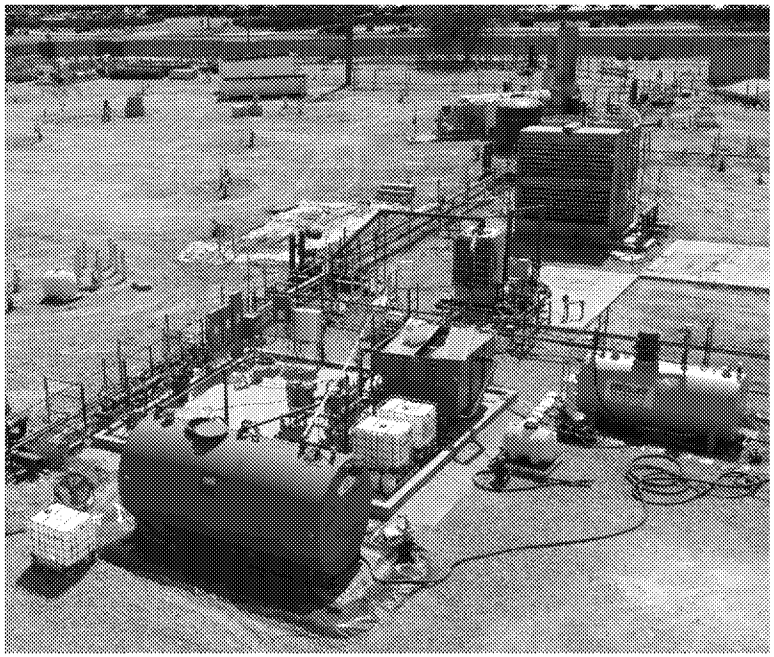
Extraction Well	Recnet Instantaneous Measured Extraction Rate gpm	Calculated Average Extraction Rate in Period gpm	Maximum Temperature °F	Most Recent Temperature °F	Cumulative Extraction gallons	Note
ST012-CZ07	5	5.6	175	144	3,133,146	Pump was down for repairs
ST012-CZ18	11.7	7.9	136	120	1,854,412	Pump recently repaired
ST012-CZ19						Eliminated as an extraction well by FVM#7
ST012-CZ21	11.2	1.2	150	144	986,979	
ST012-UWBZ21		3.7	162	138	448,076	Pneumatic pump
ST012-UWBZ22	0.3	0.6	146	120	416,512	Recently changed to electric. Pump motor recently replaced
ST012-UWBZ26	3.7	3.8	133	120	2,043,668	
ST012-UWBZ27			128	94	129,197	Extraction stopped due to sulfate presence
ST012-UWBZ30		0.0	172	72	1,396,565	Pneumatic pump, pumping intermittently
ST012-LSZ09	4.5	2.8	140	136	1,988,372	
ST012-LSZ11	3.2		139	106	1,284,389	Flow meter troubleshooting
ST012-LSZ12	0	0.0	130	108	1,396,016	Well pump down
ST012-LSZ23	9	2.1	113	94	2,880,970	
ST012-LSZ28			162		18,899	Eliminated as an extraction well by FVM#7
ST012-LSZ29			>170		17	Eliminated as an extraction well by FVM#7
ST012-LSZ37	14.1	14.0	132	90	4,293,991	
ST012-LSZ38	2.3	2.0	160	94	691,608	
ST012-LSZ39			92	78	1,250,933	Extraction stopped due to sulfate presence
ST012-UWBZ28/LSZ51	6.9	6.9	146	128	2,163,199	
Total of Wells		50.6			26,376,948	
Treatment System		48.7			19,080,956	

Data is preliminary

Site ST012 Extraction System Performance

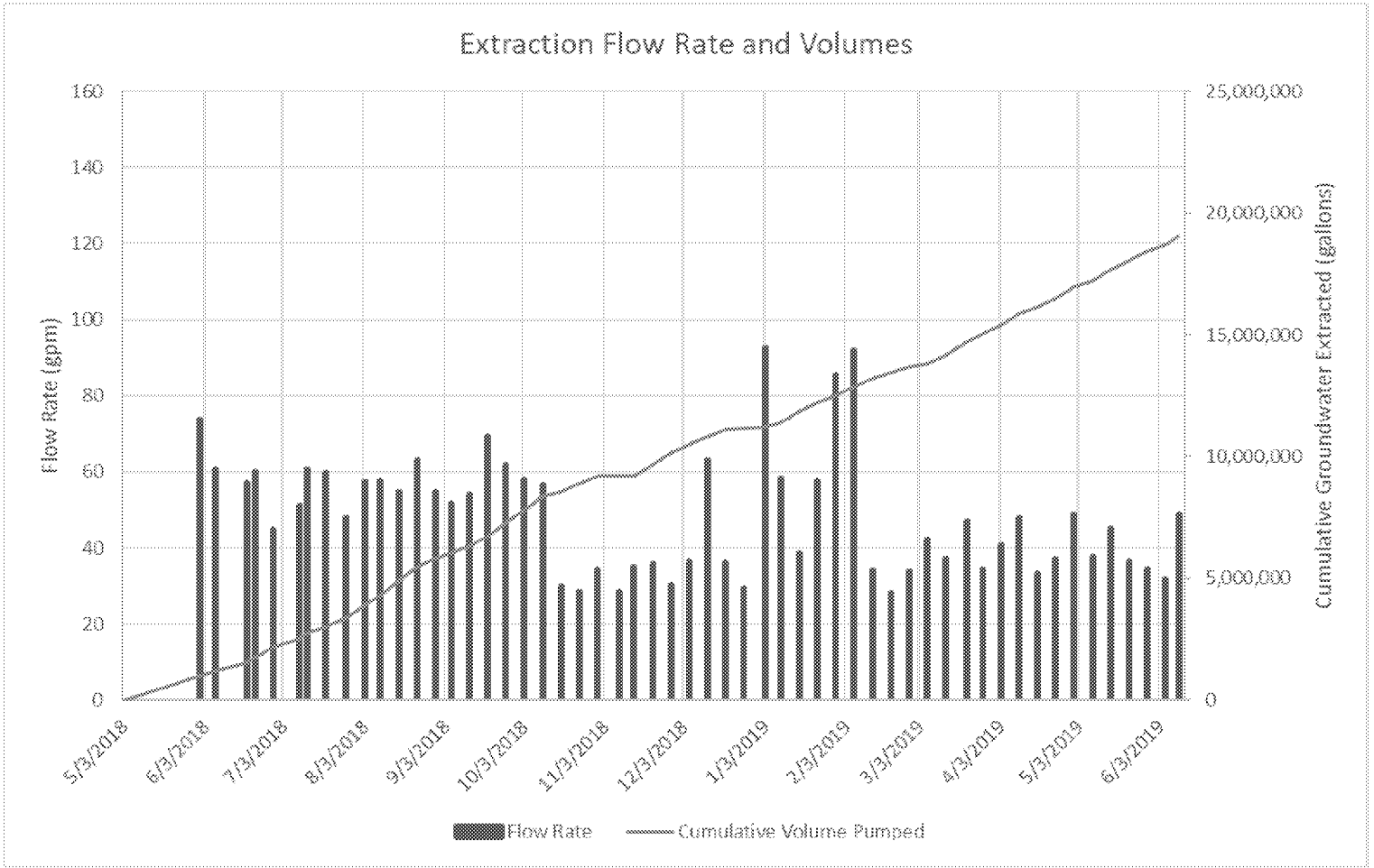
- No LNAPL has been recovered since extraction started up
- CZ07 recently went down for two days (pump replaced with pump from LSZ39)
- LSZ12 currently down
- Benzene air stripper influent at 580 µg/L for 26 May sample





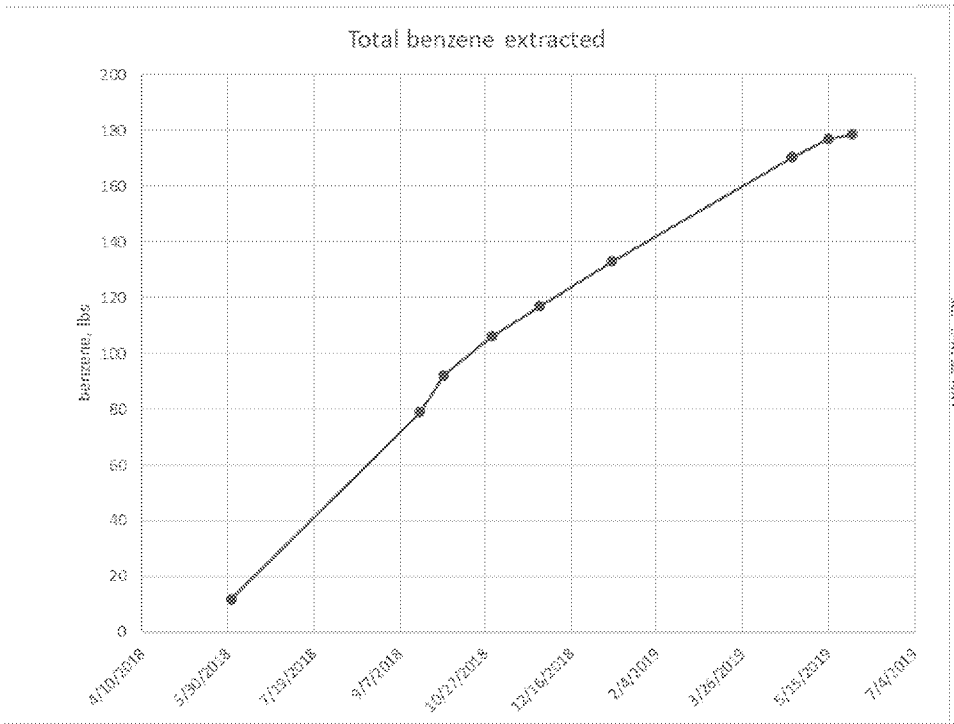
Site ST012 Extraction System Performance

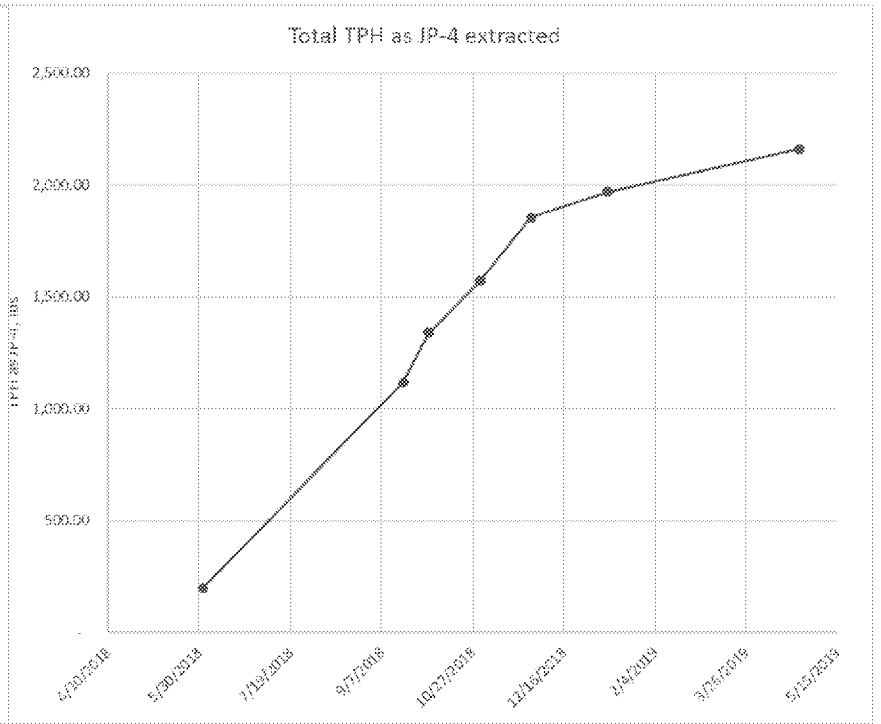
- **Overall Extraction Rates and Cumulative Volume Extracted**



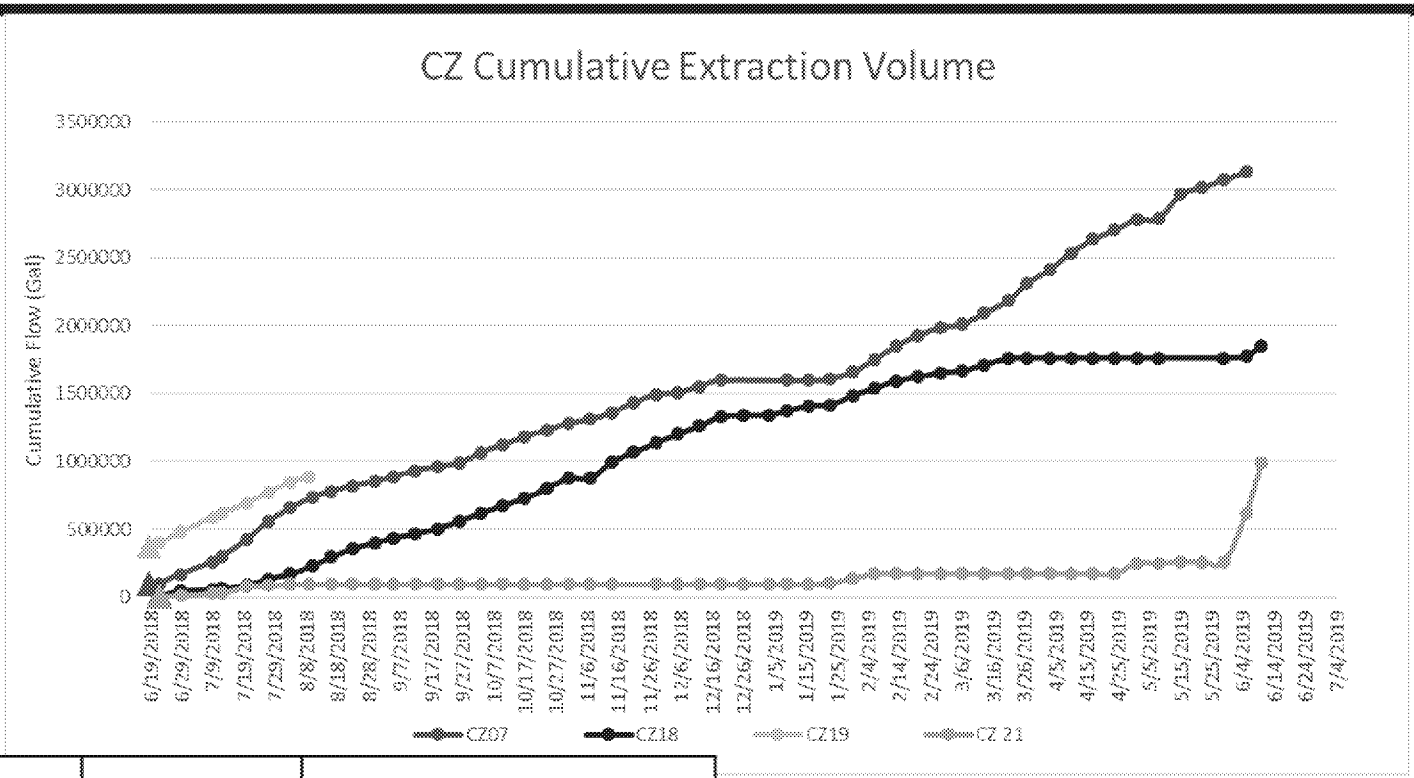
Site ST012 Extraction System Performance

- **Estimated Mass Removal by Extraction**
- **TPH analytical result for May sample are still pending (TPH graph not updated from May presentation)**





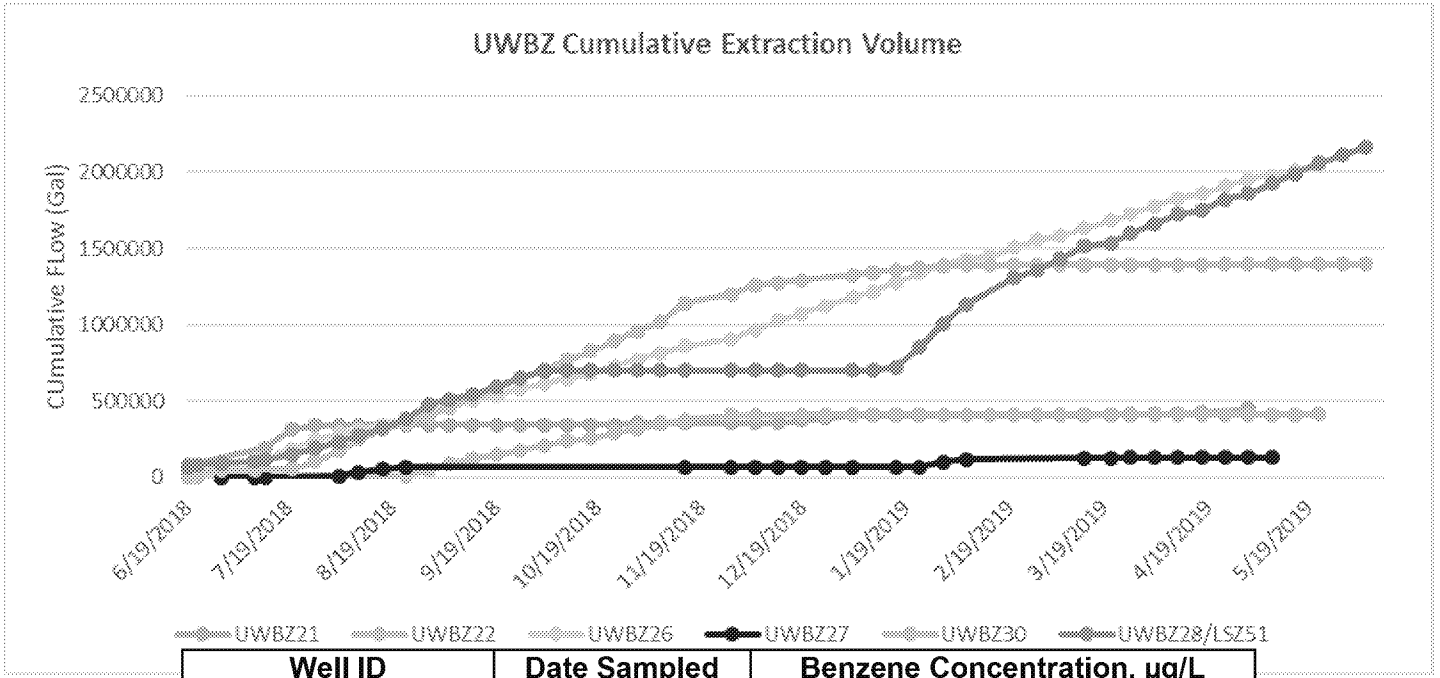
Cumulative Extraction Volume and Analytical Data by Well - Cobble Zone



Well ID	Date Sampled	Benzene Concentration, µg/L
ST012-CZ07	4/30/2018	230
	11/1/2018	600
	2/11/2019	410
ST012-CZ18	4/3/2018	1200
	11/1/2018	260
	2/11/2019	260
ST012-CZ19	5/9/2018	3.1
ST012-CZ21	4/12/2018	680

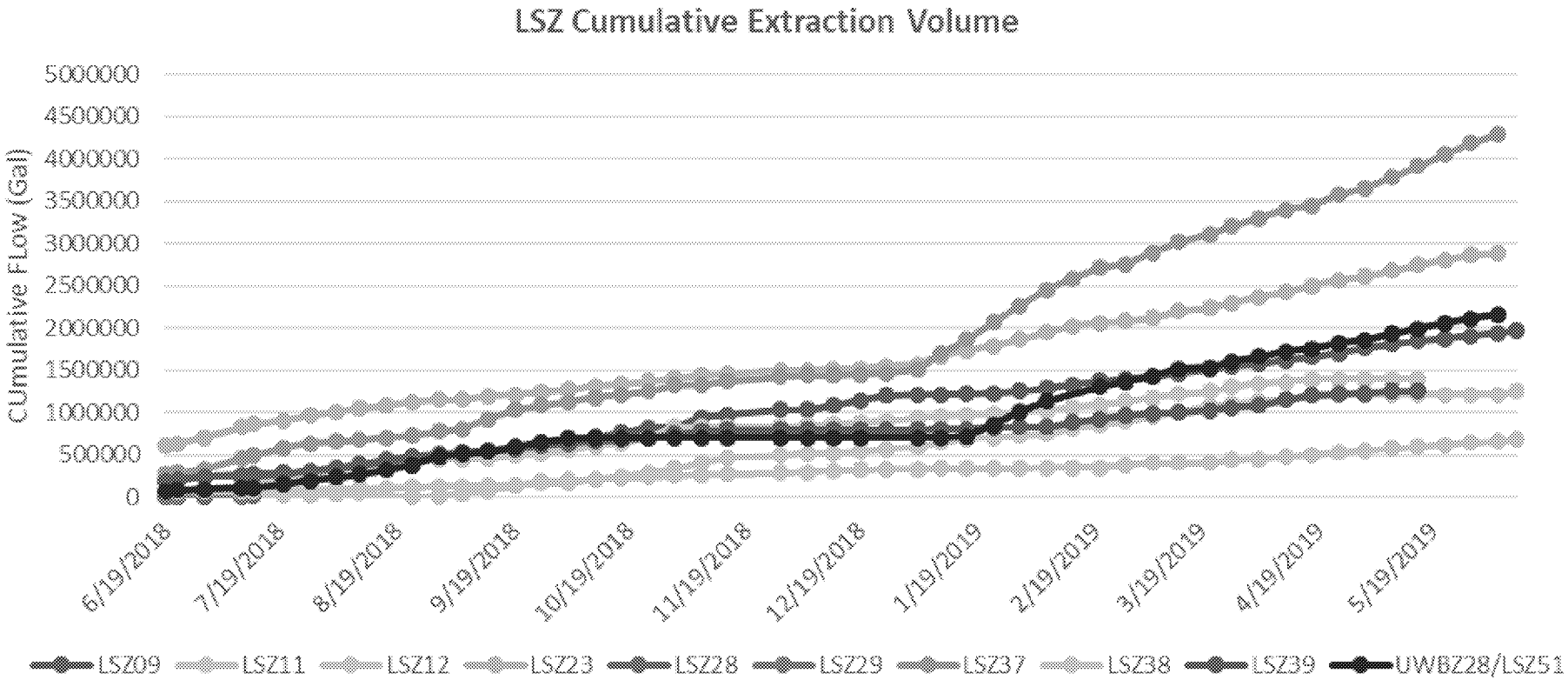
- Most recent baseline and operating (when available) benzene analytical result listed (Feb 2019 added)
- Individual well concentrations may be reduced with pumping

Cumulative Extraction Volume and Analytical Data by Well - Upper Water Bearing Zone



Well ID	Date Sampled	Benzene Concentration, µg/L
ST012-UWBZ21	8/9/2017	3400
ST012-UWBZ22	5/9/2018	1900
	2/11/2019	2800
ST012-UWBZ26	4/3/2018	3500
	4/3/2018	3700
	2/12/2019	2900
ST012-UWBZ27	4/3/2018	1500
	2/12/2019	460
ST012-UWBZ28/LSZ51	5/9/2018	1700
	3/25/2019	650
ST012-UWBZ30	5/9/2018	6000
	2/13/2019	21

Cumulative Extraction Volume by Well Lower Saturated Zone



Analytical Data by Extraction Well
Lower Saturated Zone

Well ID	Date Sampled	Benzene Concentration, µg/L
ST012-LSZ09	4/3/2018	2100
	2/12/2019	1000
ST012-LSZ11	5/9/2018	2100
	2/12/2019	3500
ST012-LSZ12	5/9/2018	1400
	11/1/2018	420
	2/12/2019	470
ST012-LSZ23	4/3/2018	1600
	2/12/2019	790
ST012-LSZ28	12/1/2016	110
ST012-LSZ29	4/10/2018	2.1
ST012-LSZ37	4/12/2018	2700
	2/12/2019	460
ST012-LSZ38	4/3/2018	3000
	11/1/2018	1300
	2/12/2019	2100
ST012-LSZ39	4/12/2018	3100/5500
	2/12/2019	130
ST012-UWBZ28/LSZ51	5/9/2018	1700
	3/25/2019	650

Site ST012 Injection Progress

- Injections continued in May-June
- Subphase 1 injections completed. Subphase 2 injections started (back to locations of previous injections)
- 171 tons injected through 10 June 2019 (169 tons was planned for subphase 1)
- 47 tons injected since last update

Date	Volume (gallons)	Number of Bags of Sulfate Added	Calculated Na2SO4 Conc. g/L	Calculated SO4 Conc. g/L	Locations(% of volume if multiple locations)
5/9/2019	9,800	5	115	78	UWBZ23 (5.57 tons)
5/10/2019	6,000	3	113	76	UWBZ23 (1.61 tons)
5/13/2019	6,000	3	113	76	UWBZ23 (3.11 tons)
5/14/2019	6,000	3	113	76	UWBZ23 (1.53 tons)
5/15/2019	6,000	3	113	76	W30 (3 tons)
5/16/2019	6,000	3	113	76	W36 (3 tons)
5/20/2019	6,000	3	113	76	LSZ50 (3 tons)
5/21/2019	8,000	4	113	76	LSZ50 (4 tons)
5/22/2019	6,000	3	113	76	No injections
5/23/2019	6,000	3	113	76	No injections
5/24/2019	2,000	1	113	76	No injections
5/28/2019	10,000	5	113	76	UWBZ33
5/29/2019	6,000	3	113	76	UWBZ33
5/29/2019	4,000	2	113	76	UWBZ33
5/30/2019	6,000	3	113	76	UWBZ33, W37 (1.7 tons)
5/31/2019	6,000	3	113	76	UWBZ33, W37 (1.4 tons)
6/3/2019	4,000	2	113	76	Finish UWBZ33 (16.7 total tons)
6/4/2019	6,000	3	113	76	No injections
6/5/2019	---	---	---	---	UWBZ34 (8.1 tons), UWBZ36 (8.8 tons)

Note:
1. blue text indicates subphase 2 injections.

Site ST012 Sulfate Method Comparison

- Comparison of field screening and laboratory sulfate results for extraction and monitoring wells (comparison for sulfate solution presented in May)
- Results are generally consistent

	Lab		Field	
Well ID	Date Sampled	Sulfate (mg/L)	Date Sampled	Sulfate (mg/L)
UWBZ27	5/15/2019	1100 D M	5/15/2019	1190
LSZ39	5/15/2019	1700 D M	5/15/2019	1425
LSZ35	5/16/2019	30 D M	5/13/2019	59
UWBZ24	5/16/2019	87 D M	5/13/2019	1
LSZ10	5/16/2019	790 D M	5/13/2019	90
			5/29/2019	2000

Site ST012 Arsenic Content of Sodium Sulfate

- Sodium sulfate composite sample is collected from each batch and analyzed for inorganics. Arsenic results as follows:

Date Sampled	As Concentration, µg/kg
4/26/2018	72 J
4/26/2018	59 J
5/13/2018	110 J
2/13/2019	180 U
2/27/2019	150 U
4/26/2019	59 J
4/26/2019	72 J
5/13/2019	110 J

- In Appendix H of the Pilot Study Work Plan, the potential arsenic loading to the aquifer was calculated for a minimum and maximum arsenic content:
  - For minimum range of arsenic content in the sodium sulfate of 154 µg/kg (1/2 of supplier's detection limit), groundwater concentrations would rise 1 µg/L on average due to the quantities injected
- Measured arsenic content has been less than the minimum range used in the work plan calculation. Therefore average contribution to groundwater would be < 1 µg/L
- Arsenic was present above the MCL in some locations prior to injection which is related to exisitng geochemistry at the site under reducing conditions

Site ST012 Sulfate Field Screening

- Sulfate field tests completed ~weekly in wells in proximity to injections
- Extraction pumps turned off in UWBZ27 and LSZ39 in response to obtaining adequate sulfate concentration in groundwater
- Sampling each extraction well after shutdown for VOCs, sulfate, and field screening SRB test (results pending)

Site ST012 Sulfate Field Screening

Date	Sulfate Concentration (mg/L)																					
	CZ02	CZ07	CZ20	CZ21	UWBZ15	UWBZ21	UWBZ22	UWBZ24	UWBZ26	UWBZ27	UWBZ28/LSZ51	UWBZ30	LSZ09	LSZ10	LSZ11	LSZ12	LSZ23	LSZ35	LSZ37	LSZ38	LSZ39	LSZ47
12/17/2018	---	---	---	---	---	---	*30*	---	---	*15*	---	---	---	---	---	---	---	---	---	---	---	---
12/21/2018	---	---	---	---	---	---	*45*	---	---	*30*	---	---	---	---	---	---	---	---	---	---	---	---
12/26/2018	---	---	---	---	---	---	146	---	---	>150	---	---	---	---	---	---	---	---	---	---	---	---
1/15/2019	---	---	---	---	---	---	45	---	---	71	---	---	---	---	---	---	---	---	---	---	---	---
1/18/2019	---	---	---	---	---	---	40	---	---	57	---	---	---	---	---	---	---	---	---	---	---	---
1/21/2019	---	---	---	---	---	---	38	---	---	66	---	---	---	---	---	---	---	---	---	---	---	---
1/24/2019	---	---	---	---	---	---	41	---	---	48	---	---	---	---	---	---	---	---	---	---	---	---
1/25/2019	---	---	---	---	---	---	250	---	---	50	---	---	---	---	---	---	---	---	---	---	---	---
1/28/2019	---	---	---	---	---	---	10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1/29/2019	---	---	---	---	---	---	35	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1/31/2019	---	---	---	---	---	---	89	---	22	---	---	---	---	---	---	---	---	---	---	---	---	---
2/1/2019	---	---	---	---	---	---	57	---	9	---	---	---	---	---	---	---	---	---	---	---	---	---
2/5/2019	---	---	---	---	---	---	37	---	25	---	---	---	---	---	---	---	---	---	---	---	---	---
2/11/2019	---	---	---	---	---	---	37	---	10	54	---	---	---	---	---	---	---	---	---	---	---	---
2/15/2019	---	---	---	---	---	---	36	---	12	48	---	---	---	---	---	---	---	---	---	---	---	---
2/18/2019	---	---	---	---	---	---	40	---	16	---	---	---	---	---	---	---	---	---	---	---	---	---
2/22/2019	---	---	---	---	---	---	---	---	22	---	---	---	---	---	---	---	---	---	---	---	---	---
2/25/2019	---	---	---	---	---	---	---	---	38	---	---	---	---	---	---	---	---	---	---	---	---	---
3/1/2019	---	---	---	---	---	---	---	---	66	94	---	---	---	---	---	---	---	---	---	---	---	---
3/4/2019	---	---	---	---	---	---	---	---	67	112	---	---	---	---	---	---	---	---	---	---	---	---
3/8/2019	---	---	---	---	---	---	---	---	104	---	---	---	---	---	---	---	---	---	---	---	---	---
3/11/2019	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3/15/2019	---	---	---	---	---	---	---	---	101	119	---	---	---	---	---	---	---	---	---	---	---	---
3/20/2019	---	---	---	---	---	---	---	---	---	97	---	---	---	---	---	---	---	---	---	---	---	---
3/29/2019	---	---	---	---	---	---	---	---	99	350	---	---	---	---	---	---	---	---	---	---	450	---
4/8/2019	---	---	---	---	---	---	---	---	81	297	---	---	---	---	---	---	---	---	---	---	153	---
4/16/2019	---	---	---	---	---	---	---	---	150	520	---	---	---	---	---	---	---	---	---	---	210	---
4/23/2019	---	---	---	---	---	---	---	---	---	1180	6	---	---	---	---	---	---	---	---	20	1220	---
4/26/2019	---	---	---	---	---	---	---	---	---	570	18	---	---	---	---	---	---	---	---	70	1230	---
5/1/2019	---	---	---	---	---	---	---	---	---	1110	12	---	---	---	---	---	---	---	---	77	1180	630
5/8/2019	---	---	---	26	---	---	---	---	---	720	---	---	---	---	---	---	---	---	---	---	1440	---
5/13/2019	1	11	0	---	4	7	---	1	17	---	1	10	20	90	4	21	---	59	---	12	---	---
5/15/2019	---	---	---	---	---	---	---	---	---	1190	---	---	---	---	---	---	---	---	---	---	1425	---
5/22/2019	---	---	---	---	---	---	---	---	---	1450	0	---	---	---	160	---	---	---	170		1420	---
5/29/2019	10	60	0	230	10	30	---	10	270	2000	20	110	2000	1010	90	30	610	0	200	130	1430	---
6/5/2019	---	80	---	280	180	---	0	---	160	1240	---	180	320	930	100	---	630	0	290	100	---	0
6/11/2019	0	---	0	230	---	30	---	0	280	---	0	120	320	830	---	0	740	---	410	150	1410	---

LSZ10 downgradient of LSZ39 (not an extraction well)

UWBZ27 extraction shut down

LSZ09, LSZ23, LSZ38 showing potential influence from sulfate injections

LSZ39 extraction shut down

Site ST012 Path Forward Jun-Jul

- **Continued SVE operation**
- **Continue pump repairs**
- **Pilot Study Implementation**
  - **Continue mixing sulfate batches and inject according to plan (FVM7) Phase 1 subphase 2 injections with the following modifications**
    - Decrease mass injected in UWBZ23 from 12 tons to 6 tons due to low observed benzene concentration in extraction well UWBZ30
    - Redistribute sulfate mass planned for UWBZ33 to other upgradient UWBZ wells due to generally consistent benzene concentrations:
      - UWBZ33: reduce from 29 tons to 17 tons
      - UWBZ34: increase from 13 to 16 tons
      - UWBZ35: increase from 15 to 18 tons
      - UWBZ36: increase from 6 to 12 tons

BCT GENERAL UPDATE

BCT Conference Call

20 June 2019

2019 BCT MEETINGS/CONFERENCE CALLS SCHEDULE DELIVERABLE TRACKING

BCT Conference Call

20 June 2019

ACTION ITEMS

BCT Conference Call
20 June 2019